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—THE— CANADIAN ARCHITECT AND BUILDER,

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(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS,
DECORATORS, BUILDERS, CONTRACTORS, AND MANU-
FACTURERS OF AND DEALERS IN BUILDING
MATERIALS AND APPLIANCES.

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64 TEMPLE BUILDING, MONTREAL.

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Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

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The journeymen painters and decorators of Winnipeg are at present on strike owing to the refusal of the employers to grant an increase of wages amounting to 2½ cents per hour all round. The scale heretofore in force has been 22½, 25, 27½ and 30 cents per hour.

THE *Australasian Builder* suggests that New South Wales copy the example of British Columbia by sending to the World's Fair specimens of its native timbers. Our Pacific province will build a structure which will contain all the varieties of native woods. It will be built in sections of contrasting woods, neatly mortised together; the roof will consist of native slate and a variety of cedar shingles. The building will be shipped to Chicago in sections, and will be put together on the fair grounds.

ADDITIONAL interest would be given to the annual meetings of the O. A. A. if to the usual exhibition of drawings there was added an exhibit of building materials and appliances. We understand that an upper flat in the School of Science might be utilized for this purpose. Such an exhibit would be especially interesting to members of the Association practising in the towns and smaller cities of the Province, who are without the opportunities open to architects in large cities of becoming familiar with the latest improvements in materials. An exhibit of this character might assist in bringing to the annual meetings a larger number of the members resident outside of Toronto. There is little reason to doubt that manufacturers and dealers would be pleased to exhibit if the necessary accommodation for the purpose was provided.

It was announced early this month by Sir John Thomson that the Dominion Government intends to erect a statue to Sir John Macdonald on Parliament Square, Ottawa, and the announcement was received by all members of the House with great satisfaction. What the intention of the Government may be as to the employment of an artist for this work we have not heard; the money has yet to be voted for the purpose, and until that is done no decision will be made. It is, however, earnestly to be hoped that the best talent in the Dominion may be secured for the work—and that there is talent capable of executing the work to be found within our boundaries there can be no reason to doubt. No one but a Canadian should have the commission for such a thoroughly national monument, and every facility should be given to Canadian artists to enable them by competition or otherwise to show that they possess the necessary talent.

THE appointment of Prof. Saunders as Canadian Commissioner to the Columbian Exposition or "World's Fair" will be a satisfaction to every one interested. Prof. Saunders has had great experience in these matters, having acted as our Commissioner in nearly all the exhibitions Canada has taken part in, and we feel sure that so far as the Commissioner is concerned, the exhibition of Canadian products and manufactures will be a success. As to exactly what the arrangements are for our exhibits, we have not yet been able to find out; very little seems to have been done as yet. The Montreal Board of Trade are taking the matter up on behalf of or in the interests of the city, and it is to be hoped that other cities will now begin to interest themselves in the matter. All loyal Canadians should do their best to make this exhibition a success, sinking petty jealousies with regard to our neighbor and remembering only the great interests of Canada.

SOME extracts from an address on "Native versus Natural Cements," are printed in this issue. The statements and deductions contained therein must prove of interest to many of our readers. Our attention has lately been called to the results of tests of Canadian cements and artificial cements under the direction of the Dominion Government engineers. These tests show that the native cement rapidly improves in quality with age. For example, while in a seven days test the tensile strength of native cement is shown to have been less than one-third that of English artificial cement, at the end of twelve months the strength of the two cements was about equal, showing that age improves to a wonderful degree the quality of the native article, which also has the advantage in point of cheapness. We would be pleased to know how far Canadian engineers and architects have gone in the direction of proving for themselves the merits of the two varieties.

THE opinion seems to be very general that work in the building trade will be quiet this year. "Things are awfully quiet" we hear remarked half a dozen times every day, with reference to all lines of business. The record of building permits taken out at the City Hall is very incomprehensible. It is stated that permits have been taken out for so many thousand dollars worth of work making a considerable increase over the amount shown by the permits issued for the same period last year. But where is the work? As it is well known there is a great deal of irregularity in the matter of taking out permits. Many people do not take any out at all until the building has been completed, and then again, many works for which permits are granted are not carried out, so that as an opportunity of comparison, the permit book is not of much value. There are several large buildings drawing near completion, but we hear of few if any as likely to be begun this year. However the season is young as yet, and we hope matters may improve as it gets older.

IN view of the penalties to which they were liable to become subject under the Employers' Liability Act, the master builders of Melbourne, Australia, arrived at an understanding with their workmen by which an insurance of £50 against accident of whatever kind was to be carried by each workman. Towards the cost of this insurance both employer and employee were asked to contribute, the latter in the proportion of sixpence per week. This arrangement, while seemingly advantageous to both parties, did not long satisfy the workmen, who began to grumble about the weekly payment of sixpence. The employers opened negotiations with the insurance company for the cancellation of the policies. Despite the willingness they thus manifested to terminate the arrangement as soon as possible, the stone masons went out on strike because it was not ended immediately. Exhibitions of unreasonableness have not been wanting on the part of employees in the building trades, but this certainly deserves to be classed as a conspicuous example. It would be safe to assume that many of those who begrudged to pay sixpence a week to secure compensation in case of accident, would freely spend twice or thrice that amount at the saloonist's or tobacconist's counter.

THE organization of the Toronto Builders' Exchange on the lines of the Exchanges affiliated with the National Association of Builders of the United States, seems likely to mark a new and better era in the history of building in that city. For years there existed the Federated Association of Builders, but having been unsuitably planned, it accomplished but little in the direction of uniting and advancing the interests of the various trades. In the new organization the weak points in the old have been carefully avoided. The officers are known to be energetic and deeply enthusiastic in the success of the undertaking. A large membership has already been secured. Under these circumstances the success of the movement seems to be assured. Some of the objects of the Exchange as well as some of the benefits which it is in a position to confer upon its members are touched upon in an article which we print elsewhere in this paper. It has clearly defined purposes, and will no doubt succeed in placing on a more satisfactory footing the interests of its members. Already we learn that communications have been received from Ottawa and other cities desirous of establishing similar Exchanges. It is to be hoped that the movement will

extend until every city of importance in the Dominion has its Exchange. When that stage shall have been reached, the next step should be the organization of a National Association representing the various Exchanges and the building interests of the whole country.

THE attention of the Government has been called to the fact that the contractor for the new Toronto drill hall is having the cut stone work done in the Province of Quebec, thus depriving local workmen of the employment to which they deem themselves to be entitled. It does appear to us, as we have before stated, that the city of Toronto having provided the Government with a free site for the building, might reasonably expect that employment would be given to local workmen who must bear their share of the taxes imposed by the purchase of the land. At the same time the city and the Government both having failed to make this a condition either of the agreement between the city and the Government or the Government and the contractor, it is too much to expect that anything can now be done to remedy the matter. The contractor in making up his tender had in view the employment of Quebec labor, as a result of which it is claimed he will effect a saving of about \$40,000. Having obtained the contract without restrictions, his right to carry it out by whatever means will yield him the greatest amount of profit, cannot be fairly called in question. Whatever fault may be found belongs to the City Council which neglected in the negotiations with the Government, to protect the interests of the local workmen.

SINCE our last issue the examinations of the candidates for admission as members of the Ontario Association of Architects, have taken place, but they were billed too late in the month for us to obtain any report as to results that we could use in this issue; we hope to be able to give full particulars next month. In the meantime we may say that by permission of the Minister of Education, the Hon. G. W. Ross, and Professor Galbraith, (who is also Chairman of the Board of Examiners), the examinations were held in the examination hall at the School of Practical Science, where in profound peace and quiet thirty-five candidates spent three hours twice a day for four days working at the papers set. The Moderators were members of the Board of Examiners, and two or three were present at each examination to order the routine and supervise. The Board of Examiners consists of Professor Galbraith, Chairman; Mr. Wright, Lecturer in Architecture of the school, and the following architects: Messrs. Burke, Gambier-Bousfield, Curry, (President of the O. A. A.), Darling and Townsend. We understand that the results will be made known as soon as possible, but it must necessarily take some time for the Board as a whole to consider the reports of each of its members and finally to decide who have passed and who have not. The candidates at these examinations, whether successful or not, will carry away with them a lesson that will serve them all their lives, so that none need think he has wasted four good days. An examination in any subject is an excellent education; it has often the effect of an "eye opener," and there are but few upon whom such a tonic does not work beneficially.

NO arrangement has yet been arrived at concerning the method to be used for propelling the electric cars of the Toronto street railway. The question is between the "trolley" system and the "storage" system; the one has about as many supporters as the other, and therefore it is difficult to come to a decision. As a matter of fact the "storage" system is in its infancy only, and, though in a few years time it may be developed with practical utility, yet at present its adoption would only be a most costly experiment and probably fraught with a good deal of danger. The "trolley" system has been tried and found practically useful in many places, and, though by no means a perfect arrangement, is undoubtedly the best, if indeed it is not the only one possible under the circumstances for introduction to Toronto. A contemporary speaks of it as "the most uncivilized convenience known to our times," and certainly it is not a desirable system were there any better to choose from, but is at present "Hobson's choice." In the meantime, while this matter remains unsettled, the streets remain in the worst possible condition. New permanent roadways have been promised for the last three or four years, yet it looks as if it will be another season before we shall see any improvement. The change of system for the street

cars, from horses to electricity means an entire change of the roadbeds over which the lines are to run. Not only have our aldermen not decided about the paving, but it is by no means certain which streets the cars will run along. It is proposed to make a single line running west on one street, and a return single line running east on an adjacent parallel street wherever such an arrangement can be carried out. When these points will be settled nobody can possibly tell. At the present rate of progress it may possibly be a couple of years or more.

OUR ILLUSTRATIONS.

PHOTOGRAVURE PLATE.—RESIDENCE OF MR. W. H. A. MASSEY, JARVIS STREET, TORONTO—WM. YOUNG, ARCHITECT, NEW YORK.

RESIDENCE OF MR. HECTOR MCKENZIE, MONTREAL—J. W. & E. C. HOPKINS, ARCHITECTS, MONTREAL.

The stone is imported freestone of a most pleasing color from the "Mowat Quarries," Scotland, supplied through Thos. Samuel & Sons, Canadian agents, Montreal and Toronto.

PREBYTERIAN SUNDAY SCHOOL BUILDING, HAMILTON, ONT.—JAS. BALFOUR, ARCHITECT, HAMILTON.

HOSPITAL FOR SICK CHILDREN, TORONTO—DARLING & CURRY, ARCHITECTS, TORONTO.

ONTARIO SOCIETY OF ARTISTS.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—The next annual exhibition of this society will be opened on May the 23rd next, in their Art Gallery, 175 King street W., Toronto. Pictures, perspectives, drawings etc., must be delivered unpacked at gallery not later than May 17th. The title of pictures, with name and address of architect to be on the back of each frame. All work must be sent at owner's risk, but an insurance during exhibition will be effected by the society. It is proposed to issue an illustrated catalogue, and to make it a success, it is necessary to have each architect represented. The size of sketches should $2\frac{1}{2}'' \times 4''$ or $4'' \times 6\frac{3}{8}''$, executed on lithographic transfer paper, grained, smooth or stippled, drawn in tuche or crayon. If unable to work in these mediums, photos to sizes may be substituted (accompanied with \$2.50 to the Committee) and they will be drawn for the exhibitor by competent artists. Sketches, photos, drawings and communications should be sent to J. A. Radford, Adelaide street E., Toronto, not later than April 24th. Entry forms to be had of the Registrar of the Ontario Association of Architects, W. A. Langton, Merchant's Bank building, Toronto, and from Mr. Clift, Secretary of the Province of Quebec Association of Architects, St. James street, Montreal.

J. A. RADFORD, { Catalogue Committee.
CARL AHRENS, }

GRANITE ARCHITECTURE.

It may be useful to note that in modern granite architecture, as in the true granite style of the ancient Egyptians, simplicity in design should be a *sine qua non*. Such a treatment gives the most pleasing effect, says the *New York Manufacturer and Builder*, and is in perfect accordance with the hard nature of the material. Any attempt at elaboration is altogether out of place. Over-wrought granite is always painful to the sensitive eye, influenced, no doubt, by the remembrance of the vast amount of labor involved in the work. Over-polishing, too, has a peculiarly harsh and repulsive appearance, especially in the Aberdeen variety. A better and more pleasing effect may be obtained by employing a breadth of unpolished surface to heighten the value of the highly polished portions.

The House Committee on Public Buildings and Grounds at Washington, D. C., devoted four hours on the 10th ult., to hearing a committee of the American Institute of Architects upon House Bill 261, which is intended to change the practice of the Government in connection with the design and supervision of public buildings by turning the same over to the best architects of the country selected for each building with special references to its peculiar conditions and needs. It was asserted that by this means the standard of design and construction of Government buildings can be greatly improved. The Committee of Architects and the House Committee seemed to agree upon all essential points.

"ONLY THE HARDWARE."

It is always instructive to examine completed works of magnitude critically, and not only to admire but also to discover whether they might have been improved, as well as to profit by the experience thus gained for future work.

Such criticism is instructive for all branches of work, and in none is it more so than in the many new buildings which are constantly being erected in our great cities.

Among these is a new and beautiful hotel building worthy of highest admiration and praise for the effective manner in which the architect has designed the structure, and also included in one consistent whole the interior decoration. The various rooms are beautifully and brilliantly finished and the Renaissance school, after which the building is designed, lends itself admirably to the application of the most elaborate and effective ornamentation. In some portions the work merges into the latter developments of the Renaissance, and Rococco decoration and the work of the First Empire is freely used.

It is unfortunate, however, that in the midst of such effective work one item should have been so neglected as to mar the completeness of the work, and by its unsuitability cause a feeling of regret when it meets the eye. The hardware, which might have given such valuable aid in the completion of the scheme of decoration, appears to have no connection with the rest of the work, and it almost seems to have been chosen without regard to any of surroundings. Although used in connection with such elaborate work, and that, too, of a period in which the most beautiful designs in metal were made, we notice only plain bronze hardware, of the barest brand colonial outlines, conspicuous only by its incongruous appearance in the midst of so much that is brilliant and consistent.

One of the most beautiful portions of the building is the main reception room, which is in the Empire style, and the detail of which has been considered with extreme care, even to the extent of the small pieces of ornament applied to the doors, while below on the same door, where so much care has been expended in carrying out the details of the style, the unfortunate hardware to which reference has been made is shown in all its ugliness, particularly as it is of plain polished bronze, while the color of the woodwork is of a cream, which is so frequently used in this style of decoration.

It is the old story: "Only the hardware," and so not worthy of notice or care by the architect or decorator, and not until the work is done and it is too late to be considered does the magnitude of the error become apparent. The time is rapidly approaching, however, when the sadly neglected item is to be wholly redeemed from its present indefinable position, and by its growing importance demand the recognition which has so long been withheld.—*Trefoil*.

The following officers have been elected by the National Art Association for 1892 and 1893: Patron His Excellency, Lord Stanley; Honorary Patron, the Marquis of Lansdowne; President, O. B. Jacobi, Toronto; Vice-President, A. C. Hutchison, Montreal; Secretary-Treasurer, James Smith; Council, S. W. Watts, Ottawa; Forshaw, Ray, Kingston; A. F. Dunlop, Montreal; A. D. Taylor, Montreal; Hamilton McCarthy, Toronto; Thos. Fuller, Ottawa; Homes Watson, Doon; Mr. Matthews, Toronto; J. C. Hopkins, Montreal; Henry Langley, Toronto; W. Brymner, Montreal, and Jos. Connolly, Toronto.

PERSONAL.

Mr. Fred. W. Farncomb has been admitted to partnership in the firm of Jones & McBride, architects, London, Ont.

We are pleased to learn that the Hon. C. F. Fraser, Minister of Public Works for Ontario, has been much improved in health by a sojourn of five months in Colorado. He has just returned home.

Mr. Murray A. White, Secretary of the Toronto Architectural Sketch Club, has removed to Chicago, having we are pleased to learn secured a position with a leading architectural firm of that city.

The firm of Daoust and Gendron, architects, Montreal, has been dissolved by mutual consent. Each member has opened an office in the city, and will continue to practice his profession on his own account.

PUBLICATIONS.

We are under obligation to the Secretary of the National Association of Builders of the United States, for a copy of the official report of the Sixth Annual Convention held at Cleveland in January last; also for a separately bound copy of the President's address.

SANITATION NEARLY FORGOTTEN

SANITARY PLUMBING.*

BY CESARE J. MARANI, GRAD. S. P. S.

BEFORE we consider its proper construction and the disposition of its waste, permit me to say that the subject of "House Plumbing" has grown enormously within the last few years, and that now it holds a place of no small importance in the planning of buildings. For this reason it is impossible for me to do otherwise than to touch on such points as I consider of greater importance, and which, I fear, are often overlooked by the owner and architect.

Now that an increased desire for thorough sanitation is being manifested by the better classes, the sanitary engineer is often called upon, if not actually to take charge of the plumbing work, at least to plan and advise in the interests of health and economy.

At present this work is largely controlled by the architect and plumber combined, who seem more eager to attain to better results, and much more

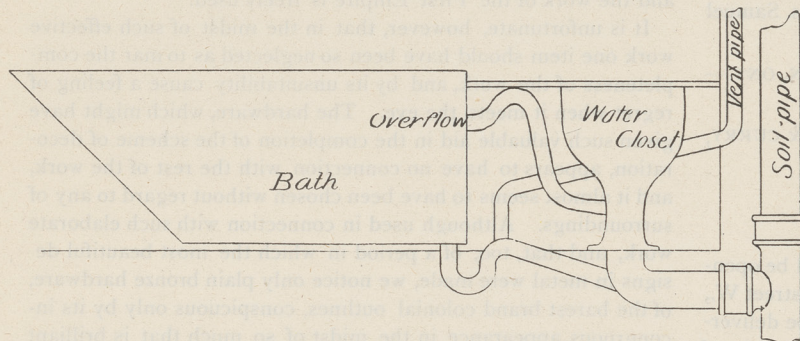


FIG. 1.

competent to do so, than they were formerly. Still it cannot be denied that the average architect possesses little or no scientific knowledge whatever on this important subject, thus clearly demonstrating a fact, that he and the rest of his profession attach too little importance to their responsibilities in connection with the plumbing of buildings, and therefore do not seem to experience for this that feeling of personal accountability so essential to success, which they do for other and less important sections of their work.

It is hardly necessary to explain that in these, and the remarks I am about to make, I refer not to the average members of "associations of architects," such as we now have in the Provinces of Ontario and Quebec, nor to the Boston Architectural Club, and other Societies in the States; but to the average, when we include all who may be said to be practising as architects, whether considered qualified to so by these architectural bodies or not, and therefore, in this way considering the actual centre of gravity that affects the general public.

Col. George E. Waring, writing on this subject for the information of architects, as well as others, goes on to say: "I have never applied a water test, under pressure, to work that has been done in a fine house under control of an architect, with any other result, so far as his frame of mind was concerned, than to annoy him by the demonstration of leaks and defects.

"What seems still more remarkable, when I have sometimes thought that I had an architect really converted, when he acknowledged the work to be simple, elegant, safe, cheap, and in every way satisfactory, was that the conversion never lasted. I never found that the example had the slightest influence on him afterwards."

Sometimes we meet with owners, who, while they show all eagerness to consider from a standpoint of comfort, any proposed piece of plumbing work in connection with their house, nevertheless seem afraid to look on the sanitary aspect of the thing, lest the necessity of adopting certain changes or precautionary measures, might rise perforce before them, like the unwelcome ghost of Banquo. In the first place, any additional expense thus entailed, proving little or no obstacle; while in the second, the smallest outlay for the protection of health, would be regarded as a dead loss, and objected to in every possible way.

That an architect should ever pander to the wishes of such people, who may be said to be pursuing an ostrich-like policy, is indeed to be regretted.

Sometimes an owner imagines that his rights as Despot in his own castle are being encroached upon. It is then the duty of the architect to point out the wisdom of providing for the preservation of health and happiness, not only of himself, but also of others, since we are creatures very much dependent on our neighbors for our sanitary condition.

I knew an architect once who tried to exonerate himself from all responsibility in connection with a certain piece of "plumbing work," by saying that he had persuaded the owner to employ the best practical plumbers in town to do the said work, and that therefore there could be nothing wrong with it.

Obviously the above reasoning was rather sophistical. Who constitute the "best practical plumbers" in a community? Are they men of science as

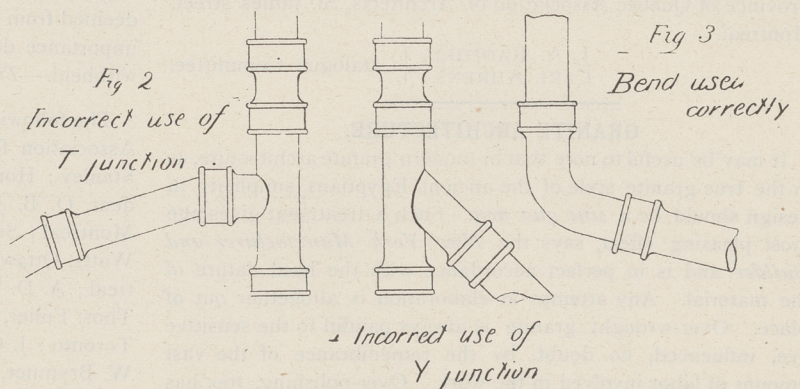
well as clever mechanics? Are they fully entitled, by a sound experience and careful study of their trade, to the full import of such an appellation? I fear not, and certainly much less to that signification which a too confiding public is ever sure to place on such titles. It is a fallacy to imagine that the knowledge of how to handle, cut, and connect pipes, wipe joints, and charge well, of necessity makes a man master of the plumber's trade. And yet I know from experience, that in the great majority of cases, this is regarded as the criterion. It might seem that the impression prevails among a large class of pipe fitters and mechanics, that the possession of a certain number of working tools, together with the valuable assistance of a couple of incompetent "shop-boys," a large shingle suspended over the sidewalk, more pronounced in its economy for truth than expense, a few cast iron connections displayed just outside the shop, and lots of gas brackets and other brass fixtures inside, constitutes a man at once a "practical plumber." There are a great many good workmen who are by no means good plumbers, and still a great number of good plumbers who are by no means "Practical Plumbers and Sanitary Engineers," as they often style themselves.

It therefore falls back on the architect to provide the soul, yes, the ethereal spirit of theoretical knowledge, and furthermore, to see the same properly and practically incorporated in the work of the plumber. That a man can pursue the plumbing trade without having first thoroughly mastered it in all its details, I consider as the great present evil. Hundreds of dollars have been spent, to my knowledge, in rectifying blunders made by such workmen, of whom it might be said, and this justly, that they had come by their trade dishonestly, because by too short a route. They of course little cared what might befall to their work, much less to the health and happiness of others, so long as they might pocket their gains and remain in blissful oblivion as to their moral responsibilities. As an illustration, of what I should term downright practical ignorance, I might give a case that occurred in the town of Brockville, Ont., a few years ago.

One of the so-called "master plumbers," who, previous to his settlement in the town, had worked at his trade for nearly fifteen years in the city of Montreal, and who was therefore looked upon by the simple public as a most desirable man to employ, actually presented a piece of "plumbing work" to be passed and approved of by the Inspector, where a two inch lead pipe, two feet four inches in length, had been bent and used under the closet seat, so as to act as a vent pipe to the closet trap, and at the same time as an overflow waste for the bath tub (see fig. 1). The workmanship, however, was simply perfect.

Not very long ago a case came under my notice in this city, where a long vertical line of soil pipes had choked and blocked up completely. It was thought at first that the servants must have thrown bones and rags, etc., down the closets, but further examination showed that there was nothing in the pipes, save the legitimate house wastes and closet paper.

The plumbers, in erecting the said line of pipes, had used too little gasket in some of the joints, and none at all in others. The consequence was, that the lead intended for the joints had spurted inside, and in some cases forming regular groups of fingers across the pipes, thus obstructing the passage of paper, etc. The only way this could be rectified was by the tearing down and re-constructing of that vertical line of soil pipes.



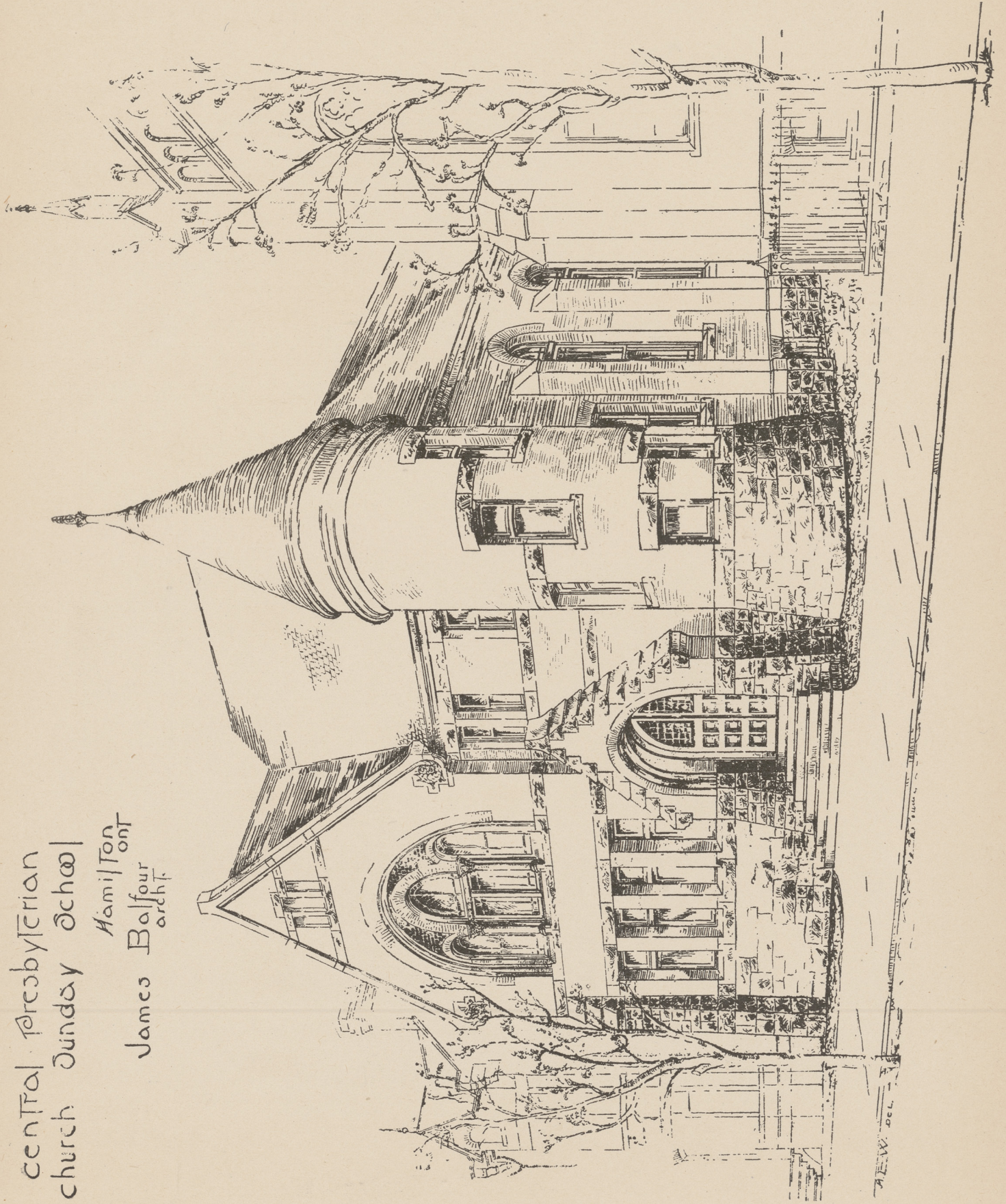
On investigation, it was found that the plumber, who was responsible for this, had no intention of scamping his work. He had made some extraordinary experiments (by himself), which had convinced him against using a gasket where he could possibly help it. He had come to the conclusion that though a gasket was of great assistance in preventing any loss of lead while pouring a joint, yet from a sanitary standpoint it was objectionable as absorbing and retaining filthy liquids. In the interests of his employers therefore, he had decided to use gasketing only where it was impossible to do without it, and the good faith of the man was manifested in that he had not charged for gasketing, nor for the amount of extra lead he must have lost in trying to fill the joints. It is needless to explain further.

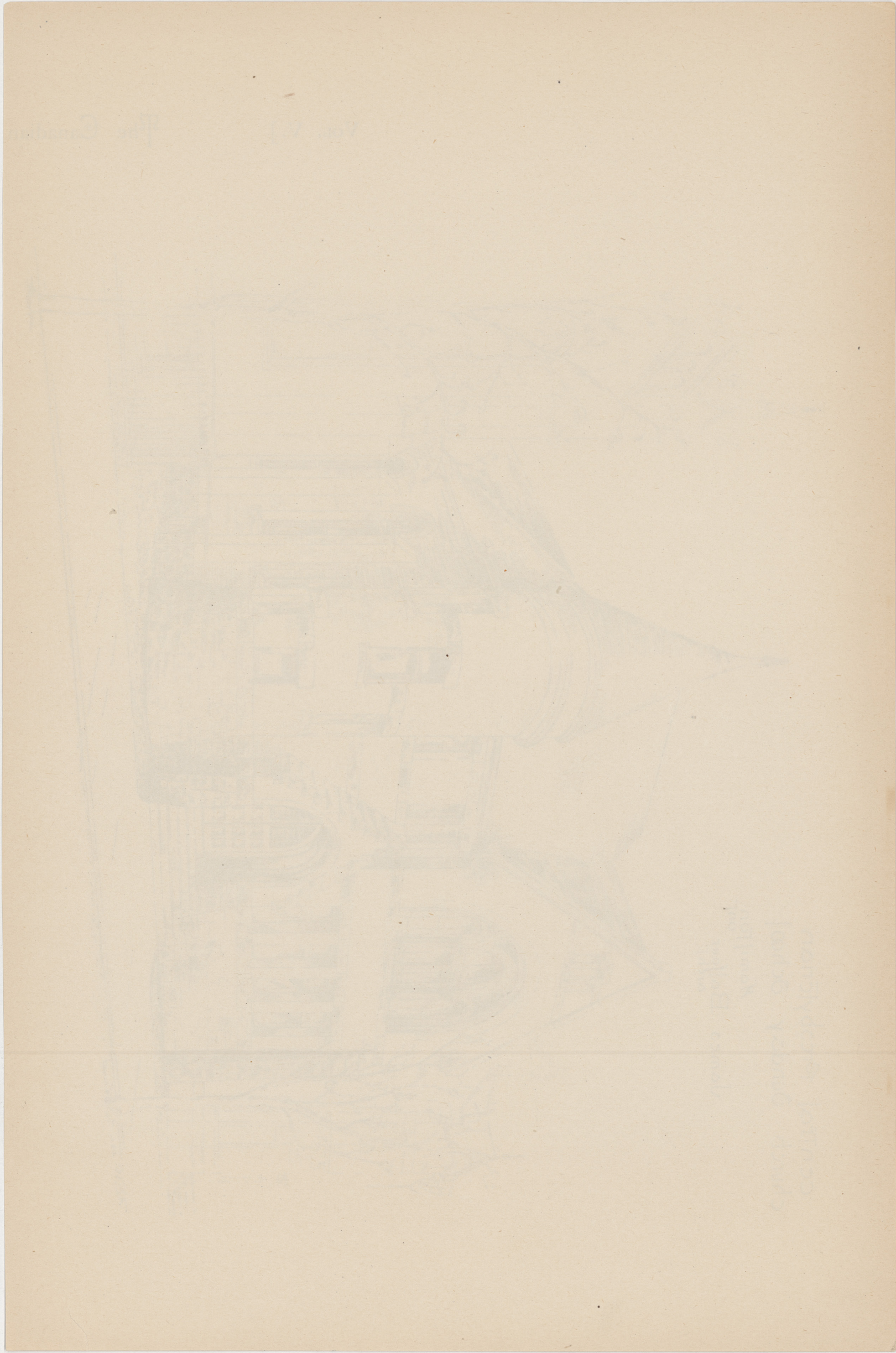
To my mind the house is the unit of sanitary administration. In fact, the whole sewerage system beyond, with its many intricacies and problems, both mechanical and financial, never would have developed, nor even have sprung into existence, but for the dwelling.

We may look upon man's modern habitation, therefore, as the principal source from whence all sewerage estimates. To secure perfect safety to the inmates, while removing at the same time the daily household wastes beyond the outer walls, is then our first consideration. Except where houses are

*Lecture delivered before the Engineering Society of the School of Practical Science, Toronto.

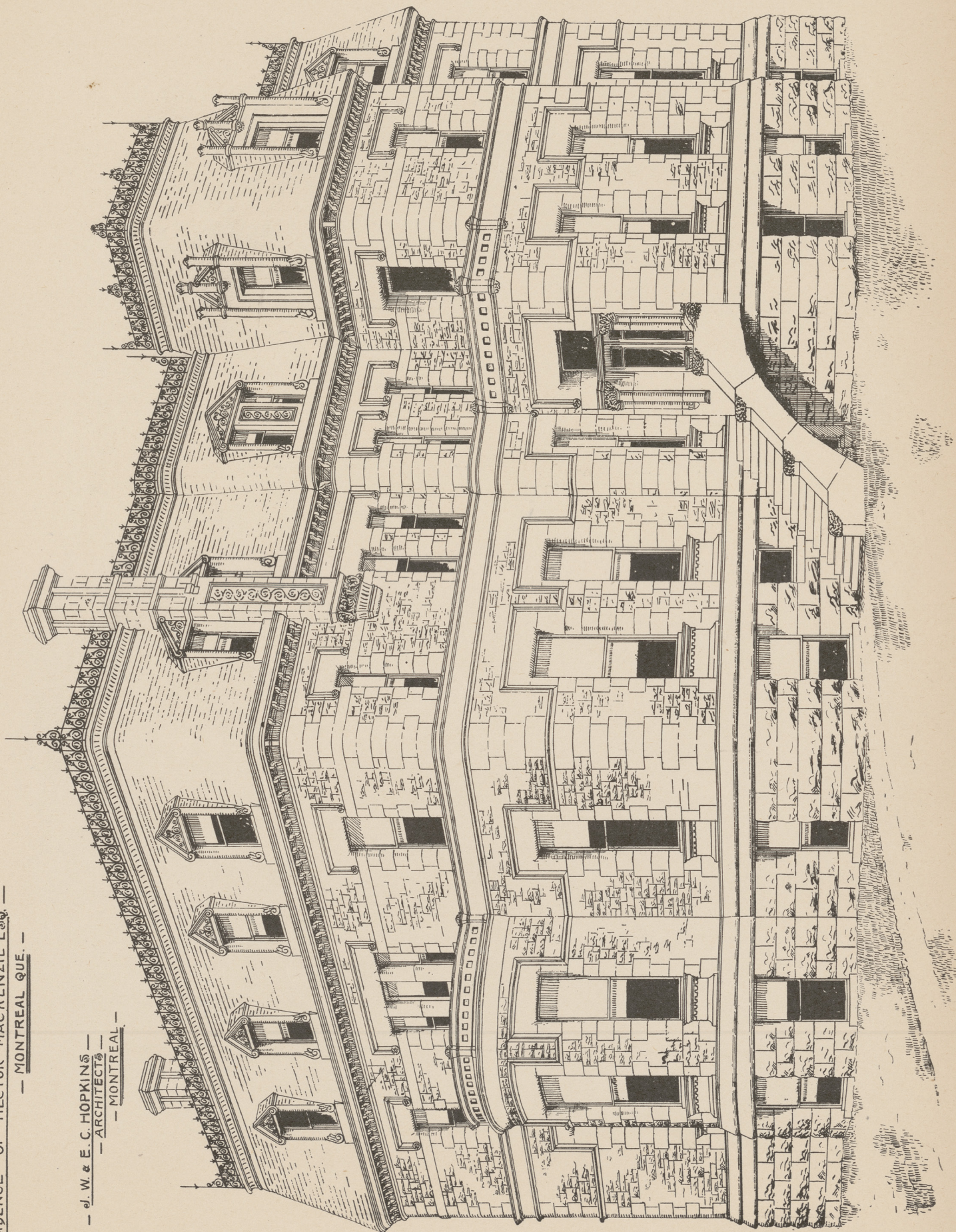
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archt.

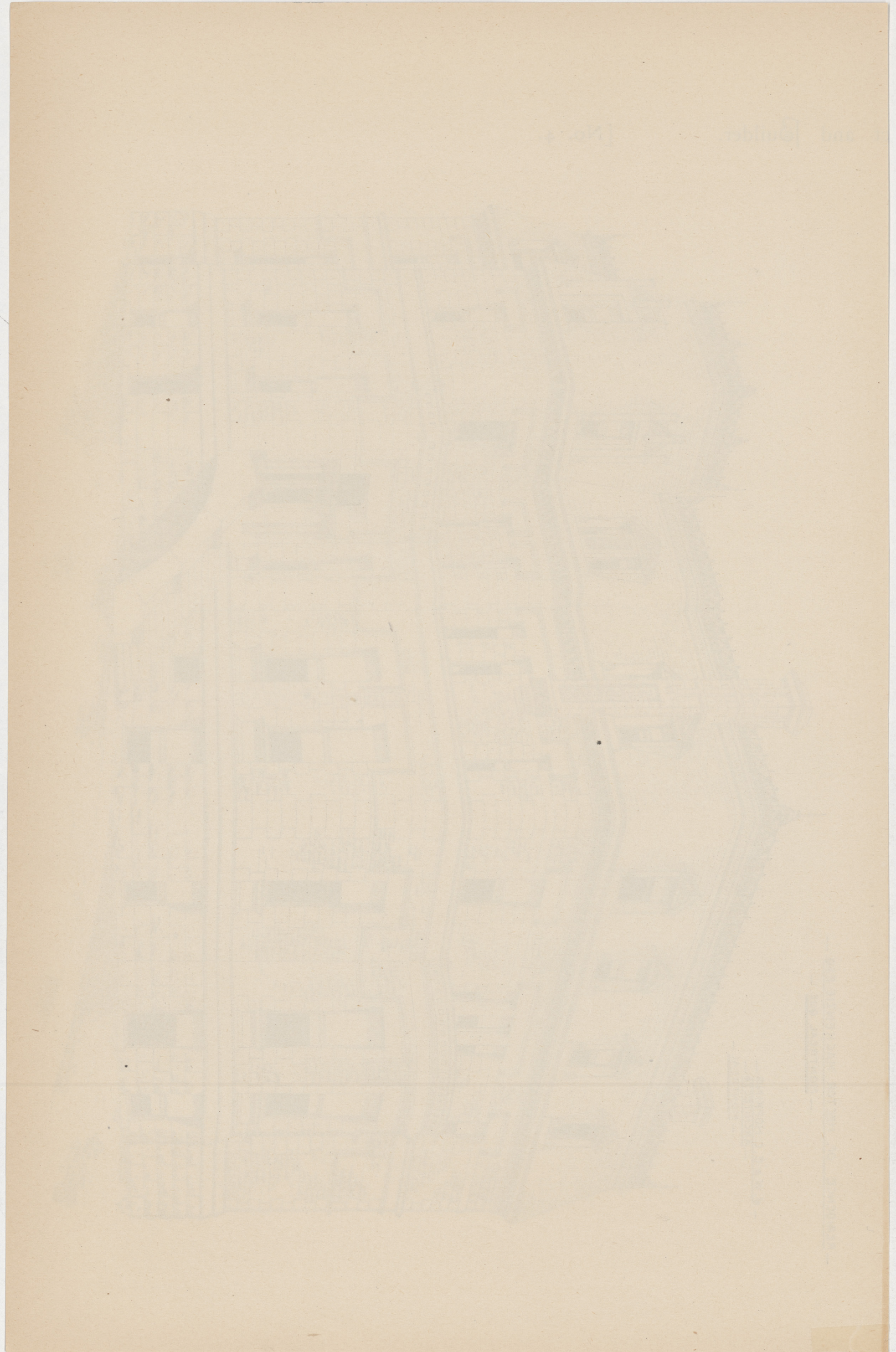


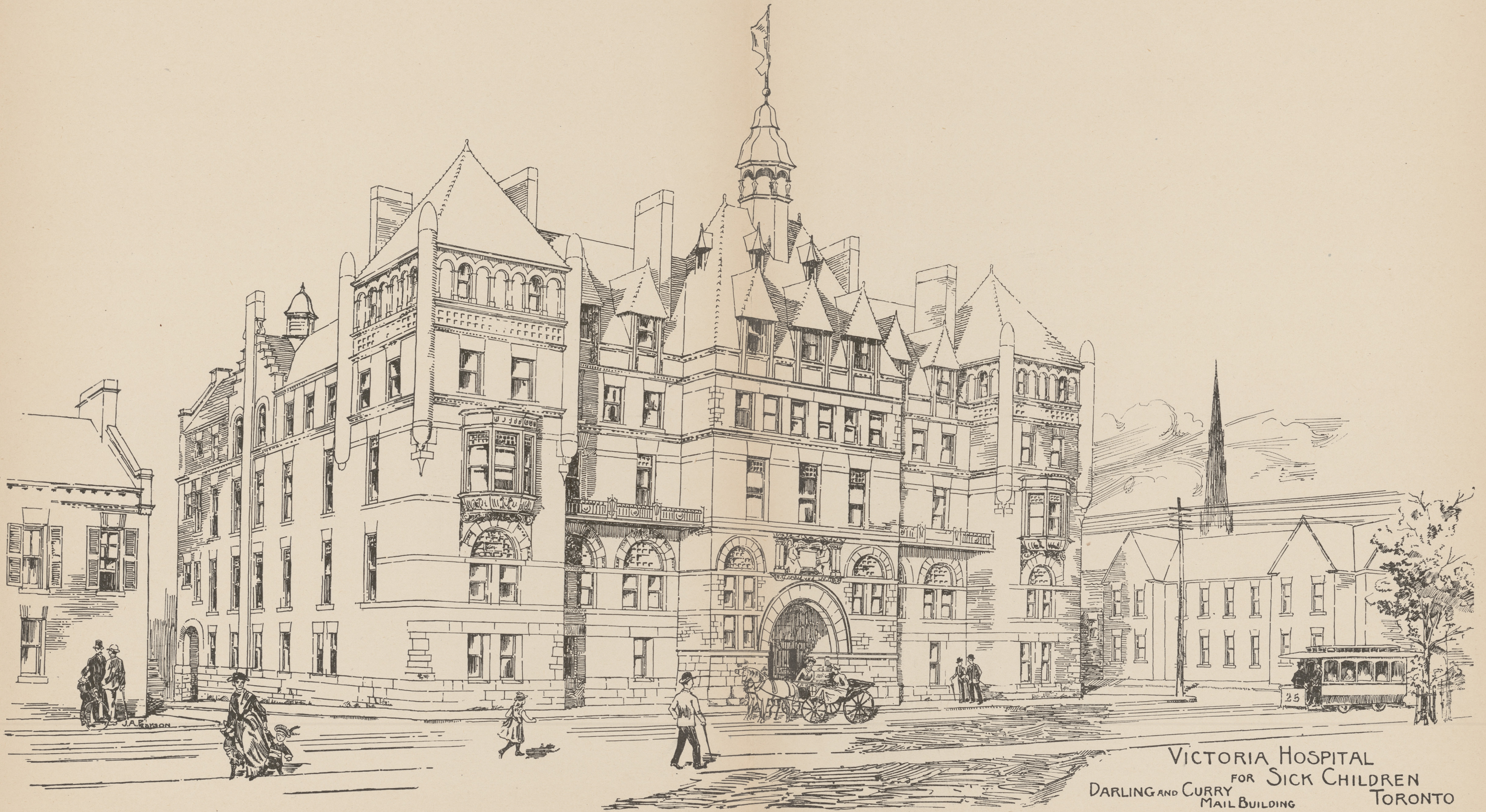


— RESIDENCE OF HECTOR MACKENZIE ESQ. —
— MONTREAL QUE. —

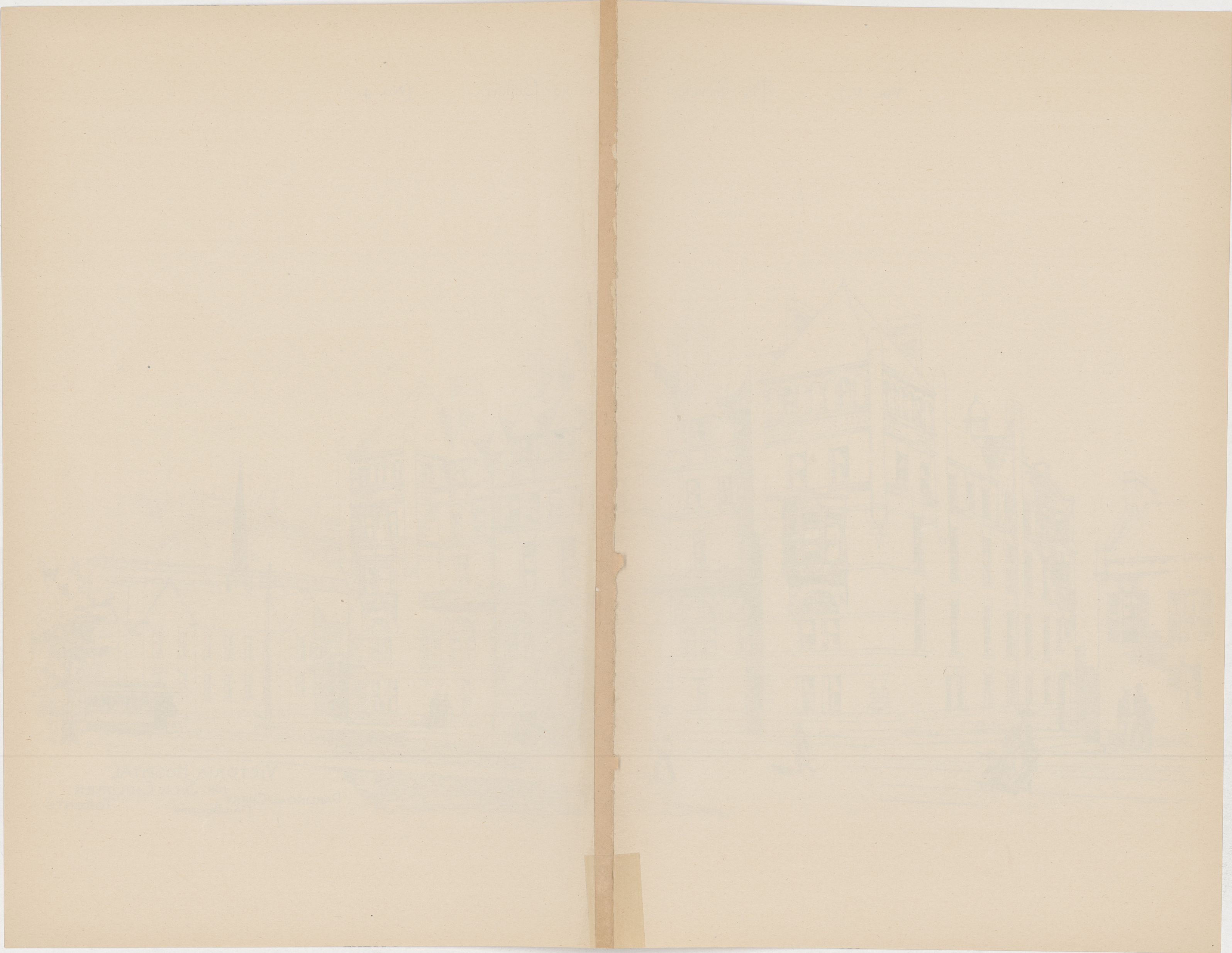
— J. W. & E. C. HOPKINS —
— ARCHITECTS —
— MONTREAL —







VICTORIA HOSPITAL
FOR SICK CHILDREN
DARLING AND CURRY MAIL BUILDING TORONTO



isolated, or strung out in small colonies along concession roads, or again clustered into hamlets and villages, what is known as the water carriage system is by far the most efficacious for the removal of the daily semi-liquid and liquid wastes of the dwelling. By wastes, I mean human excreta, chamber slops, water used for baths, water in which dishes, pots, vegetables, clothes, etc., have been washed, and in fact any water that has been put to a thousand and one of its other uses in a house. We might consider the following as our "plumbing" axioms, and the system with its fixtures, traps, ventilation, and waste pipes, etc., that will conform in the highest degree to them, must perforce be accepted as the best. It is then evident:

Firstly.—That the waste matters generated in the house should be removed at once.

Secondly.—That so far as it lies in our power, the waste pipe system should be freed from any tendency to retain decomposing matter giving off gaseous products known to be detrimental to health, or these very gases when generated elsewhere.

Thirdly.—That every part of the plumbing should be visible where possible, and conveniently situated as against repairs or accidents.

Fourthly.—That all parts should be of sound materials free from flaws, blemishes, or other defects, and of the kind of material best suited for their special purposes.

Fifthly.—That the whole system should be put tightly together, in the best approved manner, and possessing uniformity in strength and durability.

Sixthly.—That the whole system should be as simple as possible, consistent with convenience, efficiency, and security.

Seventhly.—That the appliances used should be economical, reliable, and adding materially to the comforts of the inmates of the building.

That the waste matters generated in the house be removed at once, can be attained by having as direct and short a line of waste and soil pipes as possible. Every necessary bend in a line of pipes being made by a regular curve, and never abruptly. Wherever the waste and soil pipes run otherwise than vertically, ample grades should be provided. The smoothness and evenness of the interior of the pipes, along with their size, and also the manner in which they are connected and branched together, having a marked effect on the velocity of discharge.

The use of an in erted T or Y junction for the purpose of effecting a connection between a vertical and horizontal line of pipes, should never be tolerated. The reasons are obvious (see figs. 2, 3). I have actually come across several cases of this unscientific mode of construction.

As there seems to exist, even among writers on sanitation, an uncertainty as to the exact meaning of the terms *house drain*, *soil pipes*, *waste pipes*, etc., it might not be out of place for us to decide upon their proper application before proceeding further. Let a house be given us, and a hundred feet away the street sewer. (See fig. 4).

Then the system of pipes commencing at the street sewer, running up to the walls of the house, passing through them, and then branching out throughout the building, may be divided into two parts. First, that part outside the street sewer and the outer walls; and secondly, that part inside the dwelling. The first is known as the *house drain*, or *drain*, and conveys to the said street sewer all liquids and semi-liquid wastes, and further, all roof and cellar water that may be trapped into it.

The second part, inside the dwelling, is again sub-divided into *soil pipes*, *waste pipes*, and *vent pipes*. Soil pipes, or soil pipes, are those pipes which carry away human excreta, principally from water-closets, and form the main trunks of the plumbing system of buildings. As such, therefore, they almost invariably receive in addition, the wastes from baths, basins, sinks, tubs, etc., that are conveyed to them by the waste pipes of the system.

Laterals to the main trunks, receiving liquid excreta from hoppers and urinals, are called soil pipes only in a secondary sense, while vent pipes form that part of the system which does not convey waste waters or sewerage of any kind, but is intended to afford free ventilation to the different parts, and to the syphoning of traps. Such portion of the soil pipe as may be found above the highest fixtures, however, and there for no other purpose than that of ventilation, curiously enough retains the name of soil pipe, and does not come under the classification of vent pipes.

We therefore have waste pipes in connection with all fixtures, save those into which human excreta may be emptied. These waste pipes may either enter the house drain independently, or join the soil pipe and discharge their liquid wastes into it.

Soil pipes again may convey excreta alone, or all the wastes of the house to the drain beyond the walls, while at the same time acting as the main ventilating shafts of the system, since their upper ends are always left open and carried well above the roof.

Lastly, the house drain, or simply drain, conveys to the sewer all liquid and semi-liquid wastes placed beyond the walls of the building by the soil and waste pipes.

It must be understood that we have simply considered these terms as applied to house plumbing, and house drains, and not as in the subject of land drainage, nor as in certain of the distinctions used in what is known as the "Separate System of Sewerage."

(To be Continued.)

HOW TO SELECT A SITE FOR A COUNTRY HOUSE.

THERE are no definite rules, of course, that will always apply to the selection of a site for the house. Usually it should not be placed exactly in the middle of a place, or close to the front, and it should associate itself in some way with some considerable plantation of trees that may already exist.

I am speaking of considerations that must be met in a systematic way, and more or less in accordance with the best practice of the art of landscape gardening. But avoid being too conventionally artistic. Use common sense, and first of all make your grounds comfortable and convenient; then do what you can for the æsthetic. The latter may, in your opinion, be of the most importance, but the former, be sure, will, sooner or later, revenge itself upon you for any undue neglect.

I am speaking now of all country places, meaning thereby a lot that may be only 25 feet by 100 feet, or may be five or six acres. In any case you are devising a picture when you undertake to lay out your grounds, even in the most simple fashion; and any arrangement that will develop and present with the best effect the most artistically valuable features, should be invariably chosen, though at first it may seem odd, and not in accordance with your conventional ideas of landscape gardening art. Any evident attempt at mere oddity is, of course, bad, and destructive of the harmony of the general arrangement; but there

may be an unusualness of treatment that seems odd, though in reality effective and harmonious, simply because it is conventional.

Against one thing let me warn the reader, and that is the indiscriminate use of formal foliage or flower-beds on most lawns. They are apt to lend a garish and vulgar air to the place. Close to the house you may

sometimes use one or two of these beds, but their bright red and yellow colors should be set a little on one side and not allowed to glare at one too much. I respect the universal delight in rich color, but all formal patches of color should be used carefully and in proper relations to the whole picture.—Samuel Parsons, Jr., Supt. of Parks, New York, in *March Scribner*.

POINTS ABOUT ADVERTISING.

John Wanamaker, who can claim to speak from experience says: "I never in my life used such a thing as a poster or dodger, or handbill. My plan for fifteen years has been to buy so much space in the newspaper and fill it up with what I wanted. I would not give an advertisement in a newspaper of 500 circulation for 5,000 dodgers or posters. If I wanted to sell cheap jewelry or run a gambling scheme I might use posters, but I would not insult a decent reading public with handbills. The class of people who read such things are poor material to look to for support in mercantile affairs. I deal directly with the publisher. I say to him 'How long will you let me run a column of matter through your paper for \$100 or \$500? as the case may be. I let him do the figuring, and if I think he is not trying to take more than his share I give him the copy. I lay aside the profits on a particular line of goods for advertising purposes. The first year I laid aside \$3,000; last year I laid aside and spent \$40,000. I have done better this year and shall increase that sum as the profits warrant it. I owe my success to the newspapers."

Mr. King Arnoldi, of Ottawa, recently secured judgment against the School Board of Vankleek Hill, Ont., for the amount of his fees for preparing plans for the new school at that place.

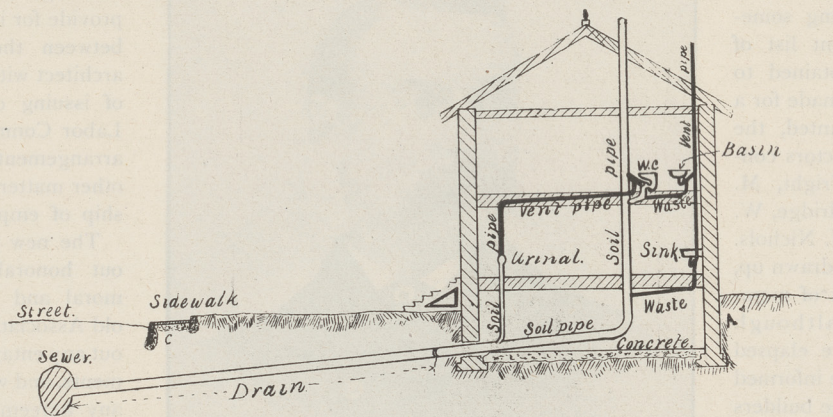


FIG. 4.

TORONTO BUILDERS' EXCHANGE.

WE have much pleasure in presenting to readers of the CANADIAN ARCHITECT AND BUILDER the portrait of Mr. Wm. J. Hill, the President of the newly organized Builders' Exchange of Toronto, accompanied by a few particulars concerning the organization. The other officers are: Geo. Moir, 1st Vice-President; Geo. Oakley, 2nd Vice-President; David Williams, Treasurer; John Aldridge, Benjamin Brick, William Park, James Crang, M. Murphy, J. L. Nichols, Directors.

The Exchange owes its existence to the fact that the Federated Association of Builders and Contractors, which it supersedes, was not fulfilling the objects it was designed to serve, and certain members determined no longer to be satisfied with its inefficiency, but to establish a new organization founded on the lines of the Builders' Exchanges represented by the National Association of Builders of the United States, whose operation has proved to be most beneficial and satisfactory. The formation of the old Association was such that it was almost impossible to secure concerted action on any question. It was composed of an equal number of delegates from the different trades, and was designed to be maintained by the imposition of a capitation tax. Being thus made up of a number of independent bodies, there was the tendency to narrowness and sectionalism when occasion called for broad and liberal measures. The organization was necessarily unwieldy and lacked cohesiveness.

In 1891 some energetic members of the Master Masons' section, as has been stated, tired of the organization and withdrew from it, with the object of instituting something better. A sufficient list of signatures was easily obtained to enable application to be made for a charter, which was granted, the provisional Board of Directors consisting of Messrs. G. Wright, M. Murphy, J. Crang, J. Aldridge, W. Williams, B. Brick and J. Nichols.

A code of by-laws was drawn up, and a book of certificates of membership printed, and although scarcely two months have elapsed since its formation, we are informed that fully 80 per cent. of the builders and contractors of the city have become connected with the organization, which may be regarded as a sufficient justification of the wisdom of the promoters of the undertaking.

The membership is divided into two classes, designated as "corporate" and "non-corporate" members. The former includes all persons actively engaged as building contractors, and the latter, manufacturers and dealers in building materials. "Non-corporate" members enjoy all the privileges of the Exchange, except that of voting. The fees are the same for both classes, viz., \$10 per year, and in the case of new members, an additional entrance fee of \$10.

Applications for membership should be made to the Secretary. The name of every applicant is posted for one week on the walls of the Exchange, at the end of which time if no objection is made the application is dealt with by the Board of Directors. The control of the Exchange is vested in a Board of Directors, who must hold corporate certificates. The Exchange has power to form sections to represent the various branches of the building trades and promote their special interests.

Arrangements are being made with dealers for a trade discount to be given to members who may pay their accounts before the 10th of each month. These discounts will be more than sufficient to cover the cost of membership. By this means also an effort is to be made to discourage the credit system which has to so large an extent demoralized the building business.

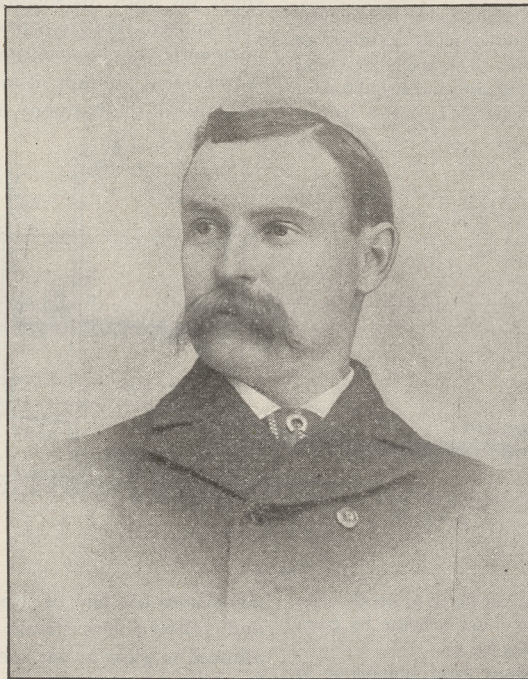
Any disputes which may arise between members of the Exchange will be adjusted by means of arbitration. Under the by-laws no member is allowed to bring suit in the courts against

another with whom he may have a difference, until every means of settling the difficulty by means of arbitration has been exhausted. Instead of appointing an arbitration committee, the whole Exchange has been constituted a committee of arbitration, so that members desiring the services of arbitrators are at liberty to select from the entire membership persons in whose judgment they may have the most confidence. In this direction the Exchange is likely to be the means of saving its members a large amount of money which would otherwise be spent in litigation. An instance comes to mind of a dispute of a somewhat trifling nature between a contractor and sub-contractor, the settlement of which by the courts cost the litigants seven hundred dollars. Such cases are not unusual, yet it would no doubt be found possible under the method adopted by the Exchange to bring about a settlement of the greater part of them at a trifling cost. Members desirous of having their claims arbitrated upon will be required to make a deposit sufficient to cover the cost. In this connection it may be mentioned that as members of an incorporated body, members of the Exchange who may in future be called upon to give expert evidence as witnesses in building cases, will be entitled to receive \$5 per day for their services, instead of as heretofore, getting \$1.00 per day as though their testimony was of no greater value than that of the laborer who might be asked to substantiate the simplest fact.

The Exchange has appointed a Legislation Committee to provide for the improvement of the form of contract, and laws affecting the building trade; a Committee to provide for improved arrangements between the contractor and the architect with regard to the method of issuing certificates, etc., and a Labor Committee to secure better arrangements as to wages and other matters affecting the relationship of employers and employees.

The new Exchange has started out honorably by paying off all moral and legal liabilities of the old Association. It starts out without any entanglements or old agreements, and will refrain from making any agreements until certain objectionable conditions which at present prevail shall have been remedied.

In concluding this reference to the new Exchange, which seems designed to have a most successful career, we reprint from a copy which



MR. W. J. HILL, PRESIDENT TORONTO BUILDERS' EXCHANGE.

has come into our hands the "Stipulations of the Toronto General Builders' Society," bearing date February, 1867, together with the names of the members representing the various trades, many of whom still occupy positions of prominence and public esteem:

1. Detail drawings to be furnished by the architect at the time of tendering.
2. Contractors to attend at the required time, and be present at the opening of tenders,
3. The lowest tender to be accepted, and if not accepted or work not proceeded with, such tenderer to be remunerated at the rate of one-half per cent. on new work, or one per cent. on alterations and repairs, for time, trouble and expense in preparing such tenders.
4. Work not mentioned in the specifications, or shewn on the drawings at the time of tendering, to be paid for as extra work.
5. The owner of the property to execute the contract in duplicate, and sign plans and specifications, at the same time as the contractor, and one duplicate original, so executed, to be delivered to contractor.
6. The contractor to be paid as the work progresses, at the rate of eighty-five per cent. on work done and materials furnished including extra work.
7. The contractor to have a lien on the building or other erection for unpaid contract money, and the right, if so disposed, to withhold possession until the contract money, or such portion thereof as he may be entitled to at the time of the completion of the work, be paid.
8. The work, as it progresses, to be kept insured in some responsible insurance office, in the name either of the owner or contractor, and such insurance to be for the joint benefit of both in the proportions in which they are respectively interested, and the premium, if paid by the contractor, to be added by him to the amount of his contract.

9. In the event of a dispute or disputes between the owner or architect, and contractor, the contractor to be allowed to appoint an arbitrator, who, with the architect, shall decide the matter in dispute; and in the event of their failing to do so, they shall appoint a third arbitrator, and the decision of the three, or majority of them, shall be final.

10. All alterations or additions to contract to be only proceeded with on the written order of architect or proprietor.

The undersigned agree with each other, well and truly to observe the stipulations annexed, in all respects according to their true intent and meaning, and not in any manner to act contrary thereto, or accept any contract in violation of the same, or at variance therewith:

Masons and Bricklayers—Scott & Stolley, Ramsay & Farquhar, Edward Synge, Thomas Snarr, Joseph Gearing, Edward Galley, Robert Carrol Jr., W. J. Hughes, W. H. Booth, William Ireson, May & Gibbins, John W. Bowden, John Platt,

Stone Cutters—Scott & Stolley, Ramsay Farquhar, Edward Synge.

Carpenters and Joiners—William Burke, Jacob P. Wagner, Withrow & Hillock, Robbins & Worth, James McBean, William Moulds, John Shanklin, William Latch, John Wilson, J. W. Phillips, John Plenderleith, Robert Kennedy, Ford & Forbes, Fowler & Coleman, William Briggs, William Horton, Mark Hall, John Oliver, Peter A. Scott, James Farley, George Emery, John Greenlees.

Painters and Glaziers—G. Percy & Son, Dill & Milligan, William Stanley, George Booth, Andrew Widdowson, James Thomson, William Fry, Robert Bell, William Elliott, Joseph McCausland, John Bilton, John Kidd, W. D. Rogers

Plumbers, &c.—John Ritchie, Cummings & Wells.

Plasterers—Joseph Gibson, Thomas Jennings, Joseph Gearing, Thomas Snarr.

OBITUARY.

WITH sincere regret we have this month to record the decease of a very worthy gentleman who for the past 17 years has been a well known figure in the city of Montreal. Mr. J. C. Radford for all this period was Health Officer in that city, and probably no civic official was better known among architects and builders. He was universally respected and his remains were followed to the grave by the City Council, the Board of Health and many with whom in life, in the exercise of his functions he had continually to do. He was a Trustee of the First Baptist Church and the President of the Temperance Society.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

I REGRET to have to state that Mr. P. W. St. George, City Surveyor, has been confined to his residence for some weeks by a severe illness. Happily however, he is now on the road to convalescence, and on the advice of his physician will spend a short time in the South. It is hoped that he will shortly return home fully restored to health.

Mr. McConnell, Superintendent of the City Water Works Department, has resigned his position owing to inability to work harmoniously with the water committee. Mr. McConnell was a valuable official, and his retirement is therefore to be regretted.

Plans have been prepared and submitted to the President of the Grand Trunk Railway Company, for the extension of Victoria Bridge, with the object of providing a grand promenade for vehicle and pedestrian traffic across the river.

An old and highly esteemed civic employé has passed away in the person of the late Mr. Glackmeyer, City Clerk. For nearly a half century the deceased gentleman satisfactorily served the city, and his removal is the subject of the deepest regret to past and present members of the Council as well as a wide circle of acquaintances among all classes of the community.

Following is a list of the members of the Province of Quebec Association of Architects registered up to the close of 1891:

C. T. Ballard, J. H. Bowe, J. J. Browne, R. P. Barnes, Chs. Chaussé, Chris. Clift, Theo. Daoust, W. E. Doran, J. E. Doré, A. F. Dunlop, A. Dubreuil, John Esinhardt, Robert Findlay, A. Flockton, A. G. Fowler, J. R. Gardner, L. Z. Gauthier, A. Gendron, Jos. Haynes, W. H. Hodson, E. C. Hopkins, J. W. Hopkins, L. C. Hutchison, A. H. Lapierre, G. De G. Languedoc, S. Lesagé, A. Levecque, O. Mailloux, E. Mann, E. Maxwell, L. R. Montbriant, James Nelson, H. C. Nelson, Jos. Perrault, H. M. Perrault, M. Perrault, A. Préfontaine, A. Raza, J. B. Resther, J. Z. Resther, J. D. Rhind, Victor Roy, J. Simard, James Smith, C. St. Jean, A. T. Taylor, W. T. Thomas, Jos. Veene, A. Vincent, W. McLea Walbank, Geo. W. Wood, James Wright, W. S. Wright, Montreal.

Chs. Baillairgé, F. X. Berliquet, J. B. Bertrand, J. George Fussièrès, Chs. Bernier, D. Ouellet, L. C. Ernest Pagé, J. F. Peachy, Thos. Raymond, Harry Staveley, G. E. Tanguay, Alfred Vallée, Quebec.

A. Boileau, St. Genevieve (Jac.-Car.)

A. H. Larochelle, Lévis, P. Q.

E. M. Talbot, St. Roch, Que.

The Art Association's spring exhibition of paintings will open next week. The following list of prizes will be offered for competition at the exhibition:—For the best figure painting, in oil \$200; second best \$100; for the best sea or landscape \$200; second best \$100; for the best portrait \$100; for the best painting of still life \$100; for the best painting by an artist under thirty years of age, not a Royal Canadian academician or associate \$100; second best \$50. In addition to these a special prize of \$200 will be awarded to the picture obtaining the greatest number of votes from visitors at

tending the exhibition, each ticket of admission carrying one vote. This competition is open to all pictures of Canadian artists without distinction, and can be won by the recipient of any other prize. It is hoped by this means to encourage a more thorough study and criticism of the pictures exhibited as well as to find out the direction of popular taste in art. It is in contemplation to make extensive additions to the Association building at a cost of about \$35,000, by means of which the picture gallery will be doubled in size, and class rooms, studio and reading rooms provided. The work will be commenced on the 1st of May.

FROST: ITS EFFECTS ON BUILDING.

Out-of-door building operations have been much interfered with by the recent frosts. In many new houses which are being erected by the speculative builder the mortar-joints and pointing have become loose or disintegrated or entirely fallen out through the moisture in the materials. The unfortunate buyer who is persuaded to invest in house property may find a heavy outlay required in making good the brickwork, in repointing, in restoring stonework that has fractured and become loose by the wedge-like action of expansion incident to frost. We cannot understand any builder, except under pecuniary obligations, proceeding with brickwork during a severe frost. He generally takes not the slightest precaution to cover the walls with weather-boards or straw or to use quick-setting mortar made of unslacked lime, a practice which prevails at Christiania, and is said to be successful. This indifference aggravates the offence. Even in Christiania, where building in frosty weather has received particular attention, it is considered that bricklayers' work does not answer in more than 14° to 9½° below freezing point. The bricks too, lie exposed to all weathers on building estates; there is no attempt made to protect them from the rain or frost; the consequence is, they are used filled with moisture or congealed water. So with blocks of stone; we have seen them sawn and left exposed to the rain or snow, and immediately afterwards cut up and built up on the brickwork. No one looks after these irregularities, and they go on unchecked until the results are shown in rotten brickwork and stone that flies all to pieces.

In glazing roofs, the same indifference to weather is met with. As glass expands and contracts by heat and cold, the putty joints give way and crack. It is very seldom that we find ordinary care shown as in leaving room in the rebates for expansion and contraction of large sheets of glass, or, better still, to fixing the glass in grooves, especially for shop-front windows. Many systems of patent glazing, such as that of Helliwell, by affording protection to the joints by lead caps, and allowing grooves underneath for condensed moisture, prevent the mischief. The effects of severe frost tell more seriously on the work of the plumber. Not only do the pipes give way by the expansion of the water in them, but the lead flats and gutters contract to such an extent as to cause them to split or tear in the weak parts, or at their connections with the flashings. Yet it is extraordinary that the same unscientific method of laying and fixing should prevail, and that architects still permit these modes of execution to be carried out, or lead to be used unable to bear the strain put upon it. When we can insist on a certain thickness of lead for flats and gutters, and specify certain methods of laying to allow for contraction, when we can incase our water pipes and cover them in non-conducting substances, and provide taps for emptying them during a severe frost, when we can fix our pipes without holding them tight at the joints, there ought to be no possible excuse for allowing them to become exposed to the destructive agencies of frost and heat. The public hailed the advent of the "registered" plumber to do much to prevent these shortcomings, to instruct in scientific plumbing, and to create an improved system of sanitation; but all will be of no purpose unless the appreciative British employer puts within his reach the means for securing the benefits of technical skill, which he can only do by putting his hand in his pocket and paying honestly those who can best do the work.

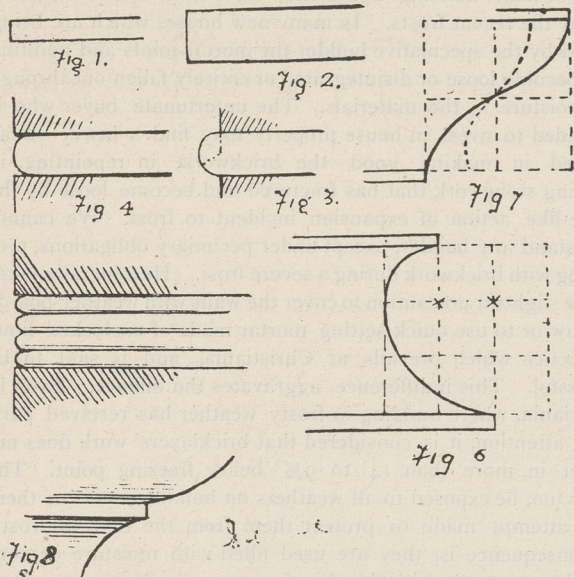
TORONTO ARCHITECTURAL SKETCH CLUB.

THE members of the above Club will hold their second annual dinner at Webb's restaurant next Tuesday evening, the 19th inst. The occasion will afford an opportunity for recuperation to those who have been expending so much energy on the recent O. A. A. examinations.

DECORATION AND FURNITURE

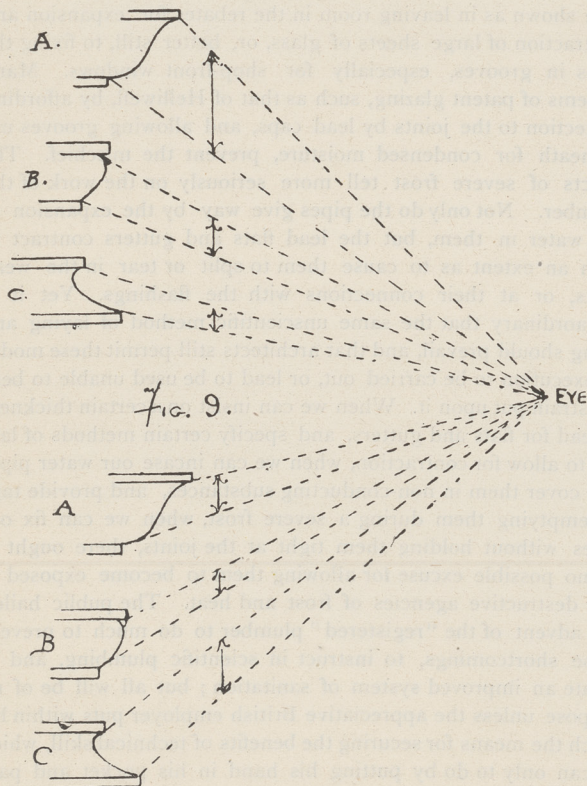
THE ARRANGEMENT OF MOULDINGS.

IN this article we purpose to show how mouldings should be arranged, according to the place and position they are to occupy. It is evident what an important part mouldings play by the fact of being employed in such different substances. They are used in woodwork, pottery, and stonework, also in jewellery, and are



perhaps the chief feature in picture frames, besides being represented in the flat by means of painted lines in such cases as the partitions on vases, painted panels on flat surfaces, etc.; and wherever a space requires a border, it is often supplied by lines of different thicknesses and depths of space between them.

Let us look at a few positions that mouldings occupy in connection with the different substances in which they are employed. Mouldings are prominent in their use to woodwork with

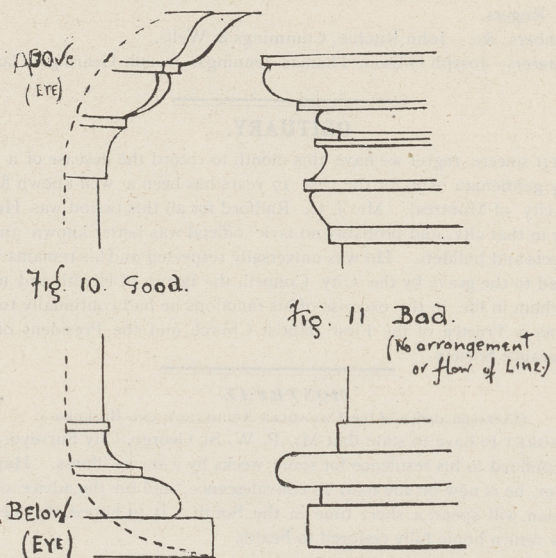


regard to panelling, and are applied to emphasize the shape of the panels on which they are used. Whenever any size of somewhat large dimensions is required to be decorated—and the space is too large to decorate directly—it is usual to panel it up into good proportions by means of mouldings. Again, in buildings they break the monotony by being introduced at the various stages or stories. For inside decoration also, mouldings are used for the cornice, and at the bottom of the dado; in fact, al-

most everything we look at has mouldings. Cupboards, table legs, and window frames, although we may not have noticed them particularly, are all, more or less, composed of mouldings. If these objects had been plain, we should very soon have noticed the deficiency—hence the value of mouldings.

Figs. 1 to 8 show the various kinds and proportions of the mouldings which we are going to consider. The designing and arranging of all of them are based on these, and it would be as well to remember that each of these belong to one of the following four classes: flat, convex, concave, or compound. A *flat* moulding is one which neither projects nor recedes. A *convex* may be any shape (*i.e.*, degree of curvature), if it projects only. A *concave* moulding is one that recedes, no matter at what angle, whilst a *compound* moulding is the combination of a convex and a concave. It is the combination of these different kinds that we are now going to consider, as well as how they should be arranged.

The several names and positions of these are as follows: Fig. 1 is called a fillet; it is the smallest moulding, but perhaps the most important one, as it is used to connect one moulding with another. The Tenia (Fig. 2) is really a large fillet, and forms the Abacus



in the Doric Order. The Astragal, shown in Fig. 3, is a convex moulding; its projection is half a circle. Fig. 4 is called a bead moulding, and is like Fig. 3 without the projection, whilst a number of bead mouldings placed together is called a reeding, as shown in Fig. 5.

The Scotia is a very fine example of a concave moulding; it recedes two-thirds its own height, and the method for obtaining it is shown in Fig. 6 by the dotted lines and xx, which mark the centres of the quarter circles. A compound moulding is the combination of a concave and convex (Fig. 7). It is often divided by a fillet (Fig. 8), which emphasizes the curve and makes effective lights and shadows. It is the difference of projection in these mouldings that makes it necessary to consider whether they should be placed above or below the eye. Fig. 6, for example, shows repetitions of the same mouldings, but by comparing *a* above with *a* below, it will be seen that the top *a* makes a capital crowning piece in this position.

Flow of line is the chief consideration in arranging the different kinds of mouldings together, and Fig. 10 shows a much better arrangement than Fig. 11. The reason for this is on account of this flow of line shown by the dotted line, which only in the one case has been regarded.—“H. R. C.” in *Furniture and Decoration*.

WINDOW GLASS IN ARCHITECTURE.

THE papers on “Painted Glass” which were read at the Institute two or three weeks ago would have been more in place, perhaps, at the Architectural Association. Good enough as far as they went, they did not go far enough to be of much service to practising architects. They told them what they knew already, and little besides. And this was not because the authors had little to tell—undoubtedly they could, under more favorable conditions, have said a great deal which would have been extremely valuable. But it so happened that most, if not all, of them selected subjects which might well have occupied a whole

evening, or several evenings; and yet were limited, in the length of their papers, to something which could be read in less than half an hour. The result was that, for the most part, they were occupied with the elementary facts of the matter. They skimmed over too large a surface, and had not time to go down to the treasures below.

Yet the treatment of painted glass, which was practically confined on this occasion to that of figure subjects, is only a small part of the question. It may be the highest part, but it is also, for most architects, the exceptional part. Every building, from the cheapest to the costliest, contains window glazing; and to many people it is constantly in view through a great part of the day. How to improve "domestic" glass is, therefore, for most of us a more intimate and pressing question than how to deal with the "storied windows, richly dight," of churches and monumental structures. We have outlived the time when a gigantic sheet of "British plate" satisfied the highest ambition of the British householder. We are in a period which is trying, like the olden ones, to apply art to common things. But though common things in brickwork and woodwork and metalwork are getting their share of attention, common things in glazing seem to be rather neglected. It is rare to find anything of this sort with a trace of art about it between elaborate stained glass and plain 21oz. sheet.

Then, again, the essential things which pertain to glass—which distinguish good glass from bad—are largely things relating to color and quality; to color and texture, if one may use the latter word for want of a better. Now, these are precisely the things which words cannot describe, and which diagrams cannot display. To make it clear which glass is excellent and which is execrable, the only way is to show the glass itself, and to show it by daylight. The difficulty is, that this can seldom be done at an evening lecture. Specimens can be handed round, but their real tints and tones when sunlight passes through them can hardly even be guessed at. And a passing glance at such specimens is not enough. They need to be stored where an architect can return and study them at leisure. They should, in short, form part of a permanent and easily accessible collection. It need be little more than a collection of samples. It is not figures of saints and angels that are wanted. It is a lot of pieces of glass of all kinds and colors, old and new. The old pieces should be marked with their date, or approximate date, and place of origin; and the new pieces with their makers' names. They would have to be fixed in leads, perhaps, for security; but there must be no labels requesting visitors "not to touch." The object is to afford facilities for getting to know them thoroughly, both by sight and feeling.

With such a museum of samples as this—a museum which, even if it occupied only one small and well lighted room, would be infinitely better than nothing, every architect would have it in his power to ascertain what glazing materials were actually available, and would be able to design his work accordingly. Of course, the scheme is not ambitious enough to attract the support of the nation or of the public. We are not likely to see it carried out at South Kensington, where the examples of old glass which exist are very inconveniently placed for study. But it would be well worth the while of any first-rate firm, concerned in the manufacture, to put together such a collection, and to throw it open to architects. It would bring more business than an illustrated catalogue, and at a fraction of the cost.—*Building News.*

We are glad to note that the day has come when the architect is beginning to appreciate the fact that the advertisers who place their business in the architectural journals are not alone advertising their goods, but making it possible for the architectural profession and building trades to be represented by the highest class and most expensive journals of the country. A few mornings since we were in the office of a prominent architect who upon opening his mail immediately consigned all the circulars, etc., to the waste basket, saying in explanation of his action that he paid about two hundred dollars a year for architectural periodicals and from these he expected to keep fully informed on all matters of interest in his business. Continuing he said: "I have little use for the firm that will seek to bore us with tons of this sort of advertising matter, and cannot see how they can expect a busy architect to wade through such a mass of stuff when he can by reference to his papers gain the desired information." As the busy architect is the only one who has use for any amount of building materials there can be no advantage in going to the great expense of reaching the man who has no better employment than the reading of circulars.—*North-western Architect.*

MANUFACTURES AND MATERIALS

HYDRAULIC CEMENTS—NATURAL AND ARTIFICIAL.*

THERE are two classes of hydraulic cements with which we are all familiar, the artificial, or so-called Portland, and that produced from natural cement rock. All hydraulic cements, whether artificial or natural, are produced by a mixture of clay and carbonate of lime, or lime and magnesia.

In the manufacture of Portland cement in England, the clay is mostly selected from the river beds and the carbonate of lime from the chalk deposits which form a large portion of England's surface, and is a nearly pure carbonate of lime. Limestone is used wherever the chalk is unobtainable in some parts of England and Germany, and elsewhere, and is finely pulverized preparatory to its mixture with clay. These two ingredients are usually mixed together in a pug mill, with a free use of water. Sometimes, however, they are ground together in a comparatively dry state.

The material as it enters the kiln, whether it be an artificial mixture or a natural cement stone, is a mechanical combination of two chemical compounds, *i. e.*, silicate of alumina and carbonate of lime. The preliminary operation in calcination is the expulsion of moisture, which is soon followed by the carbonic acid contained in the carbonate of lime. The Portland cement manufacturer has it in his power to control the proportions of the materials he uses, and renders it possible for him to make his product uniform. Careful attention to proportions and mixing, and care in the matter of calcination, will produce a cement that seemingly leaves little to be desired. But so long as these details are entrusted to the hands of ordinary laborers—and there seems to be no other way—so long as the natural cements sustain their present reputations, and through their very cheapness keeping down the price of Portland, none but the cheapest class of labor can be employed in the manufacture of artificial cements, and no matter how vigilant the superintendent may be, there will be failures, and sometimes disastrous ones.

Henry Reid, in his admirable work on Portland cement, says: "Chalk and clay, being capable of easy solubility, are charged in their progress through the wash mill with three or four times their weight of water, and theoretically this process appears perfect, but practically, as we shall endeavor to show, there is considerable inconvenience, if not danger, even under the most careful supervision. The difference in the specific gravity of the chalk and clay involves an irregular deposition of the washed mixture, not only in its final settlement in the 'back,' but on its way along the shoots. In the most limited works this objection exists, and in the largest in a more aggravated degree, for the farther from the wash mill the liquid material has to be propelled the greater must be the amount of its irregular and eccentric precipitation." Again he says: "The Portland cement maker has to reduce his raw materials to such a degree of fineness as will permit of their accurate combination, and this can be effected in two ways—the one chemical and the other mechanical. The former, the more expensive of the two, by converting the carbonate of lime into lime, and the silica into soluble silicates, and thus ensure an accurate result, but not one that a Portland cement maker can indulge in, and which we need not further discuss because of its costliness."

In speaking of the dry method, which is simply the mechanical reduction of the raw materials by means of suitable machinery, Mr. Reid says:

"When this is performed in a slovenly, careless or ignorant manner, much danger and expense arise. Doubtless this plan admits of no loose or 'rule of thumb' treatment. Chemically, the lines laid down must be implicitly adhered to, and mechanically, the reduction of the ingredients should be as nearly perfect as possible. There is a danger attending this method, which is sometimes a puzzle to the ignorant, and that is, the want of proper care in applying the necessary moisture to render the mass plastic enough for moulding into bricks (preparatory to calcination). If the water is carelessly thrown on, as is the case in tempering clay for brick making, there is a liability to separate the atoms of carbonate of lime from those of the silicate of alumina, and thus destroy the necessary accuracy of combination so essential to an effective kiln result."

Now here are the two methods employed in the manufacture of Portland cements, the wet method and the dry, and we have shown that both are attended with a danger that must ever be constant, so long as the matter of communion is entrusted to human hands.

While nature did not always deposit her natural cement rock formations in true combining proportions, no handicraft has ever yet excelled or even approached her in the art of mechanical combinations of clay and carbonate of lime, for with natural cements, however much the proportions of ingredients may vary as between the upper and lower layers, there is usually a large percentage of the bed that is so well proportioned as to yield a good cement when all are mixed together. And even the layers that are not properly proportioned, owing to their finely commingled condition, are not as dangerous an element in the mass as is that of an equal amount of an imperfect mixture in an artificial cement. There was imported into this country during the past year about 600,000 barrels of Portland cement, and it is safe to assume that there were not more than 15 analysis made from this enormous amount. That is one analysis for every 40,000 barrels, and, so far as I have been able to learn, no two of these are found to agree.

Furthermore, it is possible to adulterate Portland cements, and, if we are to believe the printed reports of the transactions of the association of Ger-

*Extracts from a Paper read before the Society of Arts of the Massachusetts Institute of Technology, Boston, Mass., by Mr. W. Cummings, of Buffalo, N. Y.

man Portland cement makers, adulteration with slag and other similar materials is carried on by some of the manufacturers to an alarming extent. No one ever heard of a maker of natural cement in this country adulterating his product. It would not pay, for there is no material, useful for that purpose, so cheap to him as the natural cement rock. Honesty, therefore, in this respect, is reasonably well assured.

An over-clayed natural cement will behave better under test than an over-clayed artificial cement. The cause of this is to be found in the much finer condition of the former. Neither of them will act well in frosty weather. An engineer uses what he may consider a first-class natural cement late in the fall, and finds it to scale and disintegrate. He uses Portland in the same way, and it remains firm, and he is more than ever convinced of the superiority of the Portland. But he has unwittingly drawn an unfair comparison. The natural cement that he had selected, however well it may have acted earlier in the season, was over-clayed, and therefore required more water than a well-balanced cement, and consequently it was more liable to expansion and disintegration by frost. It is an error to suppose that the natural cements of this country are all about alike, and that the testing machine will very quickly tell us of whatever differences may exist. A well-balanced cement will withstand the action of frost many years, while an over-clayed one will not, whether natural or artificial, and of this the testing machine gives no indication. If we take two cements, the one being natural and the other artificial, and so nearly alike in composition that a chemist could not distinguish any difference, both being made up of correct combining proportions, the artificial will test higher than the natural product; but can it be truthfully maintained that it is the better of the two?

If we are governed by the prevailing public opinion, we must admit it, for the testing machine says it is so. Had the chemistry of cement and the laws governing combining proportions been made more of a study in the past, we should not now see the whole question submitted to this crucial test, called tensile strain.

Commencing with the year 1825, when Portland cement was first produced, until 1858-60, the natural cements were sold at a price fifty per cent. higher than the artificial cements would bring in the markets of England. Then the tensile strain testing machine was brought into use, and, to the surprise of all concerned, it was found that the artificial products tested higher than the natural brands. This was a revelation that brought joy to the hearts of the heretofore languishing manufacturers, and produced a correspondingly depressing influence over the fortunes of the manufacturers of natural cements. If the Portlands were superior to the natural cements, it is a little strange that such engineers as Grant, Coulson, Mann and others had not discovered it in all those years prior to 1860. But the tensile strain fever had set in, and men argued then, as they do now, that if one cement sustains a higher tensile strain than another, it must be better because it is stronger. And this argument seems unanswerable, and, coupled with the fact that it is a quick and ready means by which the engineer may draw conclusions, has been the cause of its adoption to such an extent that to-day the engineer is considered behind the times who does not have excess to a testing machine.

Looking at this point from the standpoint of one who has had over 30 years of practical experience in the manufacture of cement; witnessing the entire rise and growth of this modern giant, the testing machine; always ready to adopt any and everything looking to an improvement in the quality of hydraulic cement; studying the action of all the leading brands in the market under varying circumstances, and devoting much time to the deeply interesting study of endeavoring to discover the connecting link that ought to exist between high tensile test and first quality, and oftentimes seeing a cement that was notoriously over-clayed test 100 pounds to the square inch, while another cement nearly perfect in its composition testing barely 60 pounds, and the resident engineer deciding unhesitatingly in favor of the higher testing brand, without a thought bestowed on the question of analysis and combining proportions, and all that goes to render a cement capable of withstanding the changes incident to this trying climate with its extremes of heat and cold, we have sometimes been forcibly reminded of the old adage that "a little knowledge is a dangerous thing."

During the past summer a professor of high repute in one of our leading colleges condemned outright one of the best natural cements I ever knew, a cement that had been thoroughly tried in the construction of masonry in bridge piers, where the current was so powerful and the flow of ice in the spring so terrible that the late Col. Eads declared that no bridge piers could be built to withstand the shock. I mention this to illustrate the workings of the testing machine. If it can deceive a professor in one of our foremost colleges who can it not deceive?

Imagine the fantastic tricks it is capable of playing among the ranks of the city engineers throughout the land. First one brand forging ahead, then another. At last one is reached that shows so far ahead that it soon becomes a hot favorite, and he feels like tying to it. One more trial and it drops away in the rear, and the engineer scratches his head.

(To be Continued.)

A correspondent, writing to *Stone*, says: "It has been quite recently demonstrated that slate, ground up and bolted, can be made into a plastic mass, involving great pressure, and the product then subjected to great heat, changed into an enduring and solid stone. The paste can be formed into anything that can be formed into moulds or by the hands, and everything that is now made from the actual stone can be formed in this way."

GRANOLITHOS—A NEW BUILDING MATERIAL.

By G. F. STALKER.

It is always an advantage to architects to have brought to their notice the qualities and properties of any material, artificial or otherwise, that is intended to be used for building purposes. And as it is on their recommendation that any new material will be brought into general use, or meet with an early death, the inventors of such materials are naturally ready to afford architects every opportunity and facility in their power to satisfy themselves as to their merits. It is not sufficient that a chemical analysis and recommendation should be attached to a new cement or stone. That is good so far as it goes. So also is a proper scientific test of its strength. But to find favor in the right quarter, and to obtain permanence in its use, the new material must be capable of being architecturally treated. For lack of this, many building patents of recent years have made a short successful run, and have ultimately landed the patentees in financial difficulties. The same may be said of such materials as have been made to depend upon cheapness for their success, for some cheap things are very dear, and nothing that can be done with them will ever make them look anything but awfully cheap. At the same time, after being satisfied that a building material is all that has been claimed for it, the next question an architect wants to be satisfied upon is that of its cost.

Granolithos is the name that has been given to a new building material, and, as the name suggests, it is a granite stone. It is composed chiefly of pounded granite and Portland cement, and is, in fact, a similar composition to the granolithic pavement now so well known and so largely used. This should be a strong recommendation of its durability and toughness. And this, together with the fact that before it sets it is very susceptible to impression, induced the Canadian Granite Company to make experiments with a view to the production of a material possessing all the properties of first-class building stone. The nature of the experiments has been such as almost to make success assured. Steps and flight of stairs, with and without nosings, curbs, sills, and other portions of planer masonry were first attempted, and brought to a successful issue. Then diapers, rosettes and other methods of wall decoration so frequently employed in ornamental brickwork and terra cotta. From these to brackets, trusses and keystones successful progress was made, until now there is no kind of architectural detail, either plain or ornamental, which cannot be produced in granolithos, as well as can be done in stone or terra cotta.

The results, taken in connection with the strength and durability of the material, are eminently satisfactory. But granolithos possesses other and very important advantages in regard to its manufacture. It is quickly made, occupying less time in the production of plain or moulded work than stone treated in a similar manner. And, of course, when ornamental work is concerned, the saving of time in favor of granolithos is much greater. Again, it has been found, in the case of nearly every other artificial stone, only possible or safe to produce it in blocks of limited dimensions; whereas granolithos can be made in blocks of the largest dimensions necessary for building purposes. At the same time it can be made in blocks of the size of an ordinary brick; and, in this respect, it will be found a most serviceable material on account of its great hardness, for rounded or square corners, for archways, angles of bay windows and projections where damage is likely to occur. And, as in the process of manufacture, it is not subjected to the influence of heat or any other force having a tendency to warp or distort it, its lines are true and regular, and it suffers no shrinkage in the mass. In color it has been produced, so far, in grey, about the shade of ordinary limestone, and buff and red, very closely resembling those colors in terra-cotta.

But, with regard to the important question of cost, it is hardly possible to speak yet with any degree of definiteness. For with granolithos, as with every other material, the price will very much depend upon the amount of detail and ornament shown on the design to be produced in it.

THIS CANNOT BE REPEATED TOO OFTEN.

Stone should never be used immediately after quarrying. It should be exposed to the weather for a month anyhow before it is used. It thus becomes seasoned and will wear much better. When left to season the under side of the rock as it lay in the quarry should be exposed to the sun. When you buy stone for paving or similar purposes insist on its being turned over, that is reversed from the way it was in the quarry before it is laid. The reason for this is that the top surface is much softer, it being of later formation, stone forming from the bottom.—*Stone*.

A discovery of sandstone has been made on an island in John-son Strait, up the coast from Vancouver. The purchaser has, it is reported, bonded it to a Victoria firm for \$60,000.

To give a cold chisel a good temper is a question that is somewhat perplexing. We submit the following rule, says the *Chicago Journal of Commerce*, which, if followed in detail, will be found to be the most practical in its results: Heat the chisel to a low heat, so as not to raise the scale, and dip into a brine of salt and water, in quantities of one and ten quarts respectively. Leave heat enough in the tool to allow it being run down to a required hardness, which is designated by the pigeon-blue color. The chisel should be made stout enough to resist a pressure which in using would tend to spring it when put to a test.